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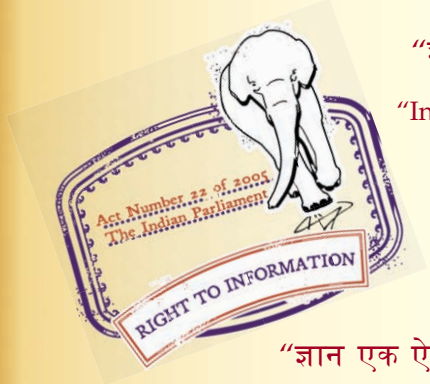
IS 869 (1976): ethylene dichloride [PCD 9: Organic Chemicals Alcohols and Allied Products and Dye Intermediates]



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Indian Standard

SPECIFICATION FOR ETHYLENE DICHLORIDE

(Second Revision)

UDC 661·723·622

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

June 1977

AMENDMENT NO. 1 FEBRUARY 1989
TO
IS : 869 - 1976 SPECIFICATION FOR ETHYLENE DICHLORIDE

(Second Revision)

[*Page* 4, *Table* 1, *col* 3, *Sl No.* (ii)] — Substitute the following for the existing:

'The difference between the temperature (running points) at which 2 and 97 percent of the volume taken have been collected shall not exceed 1·5°C and the range shall include the temperature of 83·7°C.'

(PCDC 9)

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SPECIFICATION FOR ETHYLENE DICHLORIDE

(Second Revision)

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(*Continued on page* 2)

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Indian Standard

SPECIFICATION FOR ETHYLENE DICHLORIDE

(Second Revision)

0. FOREWORD

0.1 This Indian Standard (Second Revision) was adopted by the Indian Standards Institution on 29 November 1976, after the draft finalized by the Organic Chemicals (Miscellaneous) Sectional Committee had been approved by the Chemical Division Council.

0.2 This standard was first issued in 1956, and subsequently revised in 1969 prescribing two grades of the material. In the present revision the two grades have been amalgamated and the limits for acidity and residue on evaporation have been modified to meet the current needs of the industry. Sampling procedure has also been modified.

0.3 Ethylene dichloride is used as solvent for fats, oils, waxes, gums, resins and rubber; in the manufacture of vinyl chloride; and as a constituent of anti-knock fluid. It is blended with about one-third of its volume of carbon tetrachloride yielding a non-flammable mixture, used as grain fumigant.

0.4 Ethylene dichloride is flammable having a low flash point. Its vapour produces irritation of respiratory tract and conjunctiva, corneal clouding, equilibrium disturbances, narcosis, and abdominal cramps. Deaths due to liver and kidney injury following ingestion of large amounts of ethylene dichloride have been reported. Hence, care shall be taken while handling this material (*see also* **3.1** and **3.2.2**).

0.5 This standard contains clause **2.3** which calls for an agreement between the purchaser and the supplier.

0.6 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard prescribes the requirements and the methods of sampling and test for ethylene dichloride, also known as dichloroethane, used mainly as a solvent, a constituent of fumigant formulations and a base material for vinyl chloride manufacture.

2. REQUIREMENTS

2.1 Description — The material shall consist essentially of ethylene dichloride (1, 2-dichloroethane) and shall be clear and free from sediment or suspended matter.

2.1.1 *Solubility* — The material shall be completely soluble in rectified spirit (*see* IS : 323-1959*) in all proportions.

2.2 The material shall also comply with the requirements given in Table 1 when tested according to the methods prescribed in Appendix A. Reference to the relevant clauses of the appendix is given in col 4 of the table.

TABLE 1 REQUIREMENTS FOR ETHYLENE DICHLORIDE

Sl No.	Characteristic	Requirement	Method of Test (Ref to Cl No. in Appendix A)
(1)	(2)	(3)	(4)
i)	Relative density* at 27°C/27°C	1·244 to 1·249	A-2
ii)	Distillation range at 760 mmHg	2 to 97 percent by volume shall distil between the range of 82·5 to 84°C	A-3
iii)	Residue on evaporation, percent by mass, *Max*	0·01	A-4
iv)	Acidity (as HCl), percent by mass, *Max*	0·005	A-5
v)	Free chlorine	To pass test	A-6
vi)	Moisture content, percent by mass, *Max*	0·08	A-7

*The correction factor for relative density is +0·001 5 for each degree Celsius fall in temperature and −0·001 5 for each degree Celsius rise in temperature.

*Specification for rectified spirit (*revised*).

2.3 Colour — The colour requirement of the material shall be as agreed to between the purchaser and the supplier. It shall be determined by the method prescribed in **A-8.**

3. PACKING, STORING AND MARKING

3.1 Packing and Storing — The material shall be packed in mild steel drums, which shall be securely closed. They shall be stored in a cool place away from fire and flames and provided with adequate ventilation (*see also* **0.4**).

3.2 Marking

3.2.1 The containers shall be suitably marked with the following information:

a) Name of the material;

b) Net mass of the material;

c) Name of the manufacturer and his recognized trade-mark, if any; and

d) Lot or batch number in code or otherwise.

3.2.2 All containers in which the material is stored or transported shall also be prominently and clearly marked with the legend FLAMMABLE along with the symbol given in Fig. 5 of IS : 1260 (Part I)-1973* and the legend AVOID PROLONGED BREATHING OF THE VAPOUR (*see also* **0.4**).

3.2.3 The containers may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

4. SAMPLING

4.1 Representative samples of the material shall be drawn and their conformity to the requirements judged as prescribed in Appendix B.

---

*Pictorial markings for handling and labelling of goods: Part I Dangerous goods (*first revision*).

APPENDIX A

(*Clause* 2.2, and *Table* 1)

METHODS OF TEST FOR ETHYLENE DICHLORIDE

A-1. QUALITY OF REAGENTS

A-1.1 Unless specified otherwise, pure chemicals and distilled water (*see* IS : 1070-1960*) shall be used in tests.

NOTE — ' Pure chemicals ' shall mean chemicals that do not contain impurities which affect the results of analysis.

A-2. DETERMINATION OF RELATIVE DENSITY

A-2.1 Apparatus

A-2.1.1 *Pyknometer or Relative Density Bottle* — 25 ml capacity.

A-2.1.2 *Water-Bath* — maintained at 27·0 ± 0·2°C.

A-2.2 Procedure — Clean and dry the pyknometer or relative density bottle. Weigh it, fill it with freshly boiled distilled water, place it in the bath maintained at 27·0 ± 0·2°C, and allow sufficient time (about 45 minutes) to attain the temperature of the bath. Then insert the capillary stopper which has also been brought to 27·0 ± 0·2°C. Wipe the excess liquid from the stopper, remove the pyknometer or the relative density bottle from the bath, bring to room temperature and weigh. Empty the pyknometer or the relative density bottle, clean and dry it, and repeat the operation with the material at 27·0 ± 0·2°C.

A-2.3 Calculation

$$\text{Relative density at } 27°C/27°C = \frac{A - B}{C - B}$$

where

A = mass in g of the pyknometer or relative density bottle filled with the material,

B = mass in g of the dry pyknometer or relative density bottle, and

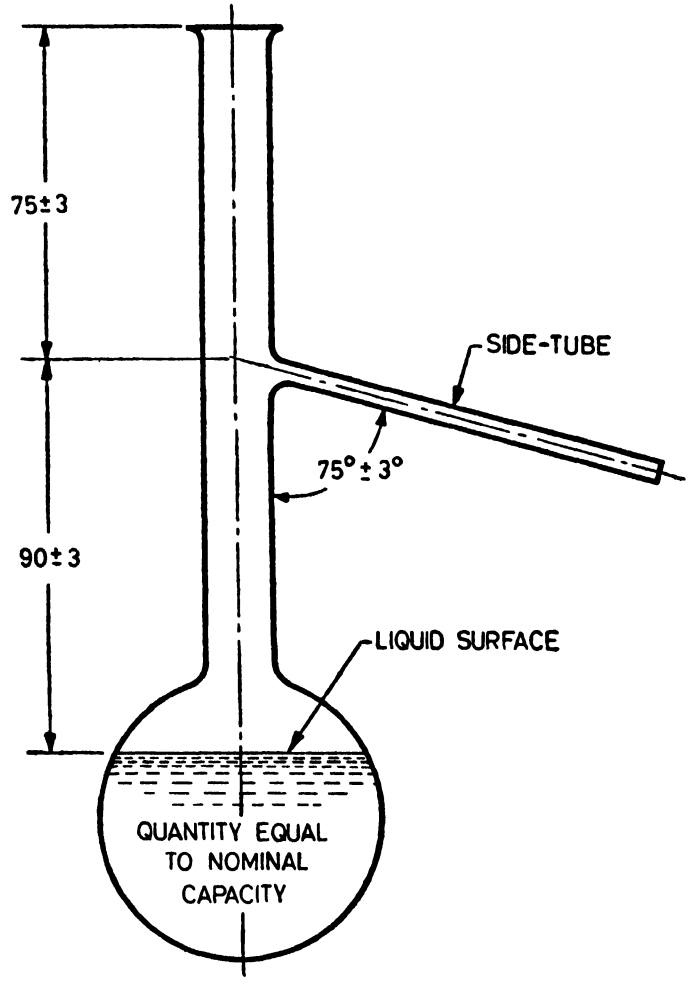
C = mass in g of the pyknometer or relative density bottle filled with water.

*Specification for water, distilled quality (*revised*).

A-3. DETERMINATION OF DISTILLATION RANGE

A-3.1 Apparatus

A-3.1.1 *Distillation Flask* — of the shape and dimensions shown in Fig. 1.



All dimensions in millimetres.

FIG. 1 DISTILLATION FLASK

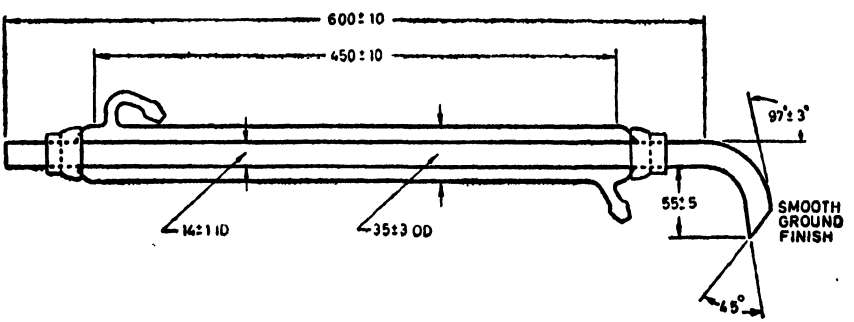
A-3.1.2 *Thermometer* — of partial immersion type, so fitted in the flask that the bottom of the capillary is level with the lower edge of the side-tube joint and the immersion mark is level with the top of the cork.

A-3.1.2.1 The recommended dimensions, tolerances and graduations of the thermometer shall be as follows:

Range	48 to 102°C
Graduation	0·2°C
Longer lines at each	1°C
Fully figured at each	10°C
Fractional figuring at each	2°C
Immersion	100 mm
Overall length, *Max*	385 mm
Length of main scale, *Min*	190 mm
Bulb length	15 to 20 mm
Stem diameter	5·5 to 8·0 mm
Distance from bottom of bulb to bottom of main scale	125 to 145 mm
Distance from bottom of bulb to top of contraction chamber, *Max*	35 mm
Maximum error	± 0·2°C

A-3.1.2.2 The thermometer shall bear a certificate of the National Physical Laboratory, New Delhi or any other institution authorized by the Government of India to issue such a certificate.

A-3.1.3 *Liebig Condenser* — made of Type 1 glass (graded according to IS : 2303-1963*), with a wall thickness of 1·0 to 1·5 mm and conforming to the shape and dimensions shown in Fig. 2.

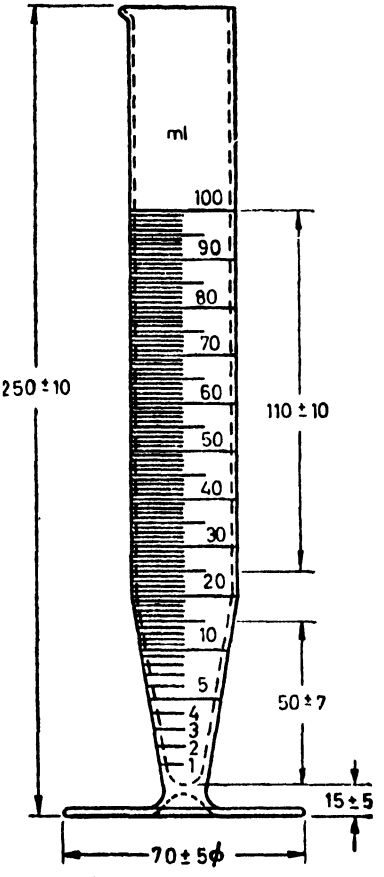


All dimensions in millimetres.

FIG. 2 LIEBIG CONDENSER

*Method of grading glass for alkalinity.

A-3.1.4 *Receiver or Graduated Cylinder* — 100 ml capacity, with 1-ml marks running halfway round the circumference, 5-ml marks running three-quarters-way round the circumference, and 10-ml marks running all round the circumference and numbered (*see* Fig. 3).



All dimensions in millimetres.

FIG. 3 RECEIVER

A-3.1.5 *Draught Screen* — rectangular in cross-section, made of 0·8 mm thick sheet metal, with the dimensions shown in Fig. 4 and open at the top and bottom. It shall comply with the following requirements:

a) In each of the two narrower sides of the draught screen there shall be two circular holes, each 25 mm in diameter and situated below the asbestos shelf as shown in Fig. 4. In each of the four

sides of the draught screen there shall be three holes with their centres 25 mm above the base of the draught screen. These holes shall occupy the position shown in Fig. 4. The diameter of each of the holes centrally situated in the longer sides shall be 25 mm and of the remaining ten holes shall be 12·5 mm. At the middle of each of the wider sides a vertical slot for the side-tube of the distillation flask, with the dimensions shown in Fig. 4, shall be cut downwards from the top of the screen. A removable shutter conforming to the dimensions shown in Fig. 5 shall be provided for closing the vertical slot not in use.

b) A shelf of hard asbestos board, 6 mm in thickness and having a central hole 110 mm in diameter, shall be supported horizontally in the screen and shall fit closely to the sides of the screen to ensure that hot gases from the source of heat do not come in contact with the sides or neck of the flask. The supports for this asbestos shelf may conveniently consist of triangular pieces of metal sheet firmly fixed to the screen at its four corners.

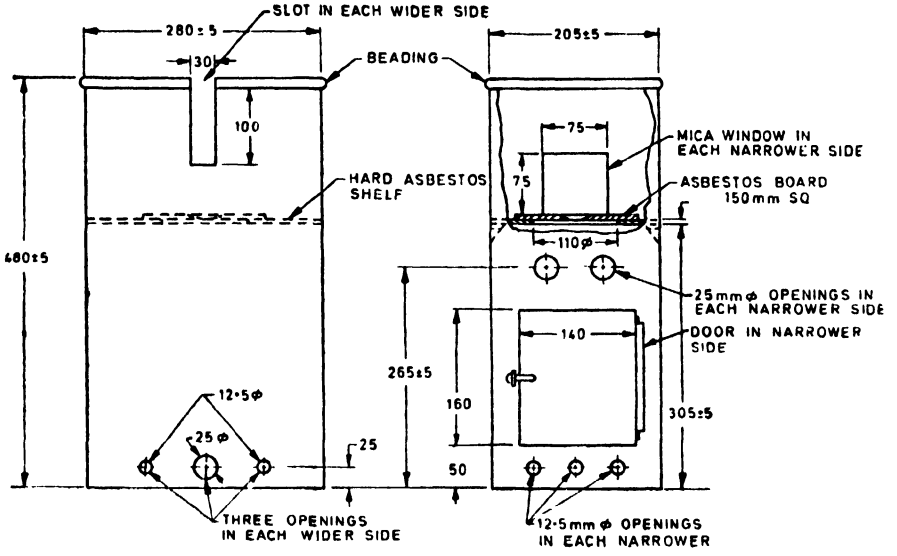
c) In one of the narrower sides of the screen a door shall be provided having the dimensions and position shown in Fig. 4. In each of the narrower sides of the screen a mica window shall be placed centrally with the bottom of the window on a level with the top of the asbestos shelf. The dimensions and position of the windows are shown in Fig. 4.

d) An asbestos board, 150 × 150 × 6 mm in size and having a central hole 50 mm in diameter, shall be so placed on the asbestos shelf that the two holes are approximately concentric and the distillation flask when in position completely closes the hole of asbestos board.

A-3.1.6 *Electric Heater, Gas Burner or Other Flame Type Heater* — any suitable heater or burner that enables the distillation to be carried out as prescribed in **A-3.2.**

A-3.1.7 *Half-Second Pendulum* — for measuring the rate of distillation.

A-3.2 Procedure — Assemble the apparatus as shown in Fig. 6. Measure 100 ml of the material at laboratory temperature by means of 100-ml receiver or graduated cylinder and transfer it to the distillation flask, the material being allowed to drain for 15 seconds into the flask. Add a fragment (about 2-mm cube) of porous earthenware or other suitable inert material to prevent bumping, connect the flask to the condenser and insert the thermometer. Pass an adequate supply of cooling water through the condenser. To receive the distillate use the receiver or the cylinder in which the material was measured, without rinsing or drying. Heat the flask slowly, especially after ebullition has begun, in order that the mercury



All dimensions in millimetres.

FIG. 4 RECTANGULAR DRAUGHT SCREEN

column of the thermometer may become fully expanded before the first drop of distillate falls into the receiver, care being taken that the total period of this preliminary heating shall be neither less than 5 nor greater than 10 minutes. Place the receiver in a manner that the condensate flows down its side. Continue the distillation at the rate of 4 to 5 ml per minute (about 2 drops per second). Read the volume of distillate in the receiver when the thermometer indicates each of the specified distillation temperatures, the temperatures on the thermometer scale being corrected as specified under **A-3.4.**

A-3.3 The difference between the volumes of distillate recorded as in **A-3.2** is the percentage by volume distilling between the specified temperatures at 760 mmHg pressure.

A-3.4 Correction of the Thermometer Reading

A-3.4.1 *Error of Scale* — In all thermometer readings, make the corrections as indicated on the certificate of the instrument.

A-3.4.2 *Correction for Barometric Pressure* — If the barometric pressure prevailing during the determination is normal, namely, 760 mmHg, no correction need be applied to the specified temperature and the thermometer scale as corrected under **A-3.4.1** shall be used as such. If, however,

the prevailing pressure deviates from 760 mmHg, the specified temperature shall also be corrected as follows:

a) For every 10 mmHg above 760 mmHg, subtract 0·42°C from the specified temperature, and

b) For every 10 mmHg below 760 mmHg, add 0·42°C to the specified temperature.

NOTE — These corrections are valid only for pressures above 700 mmHg.

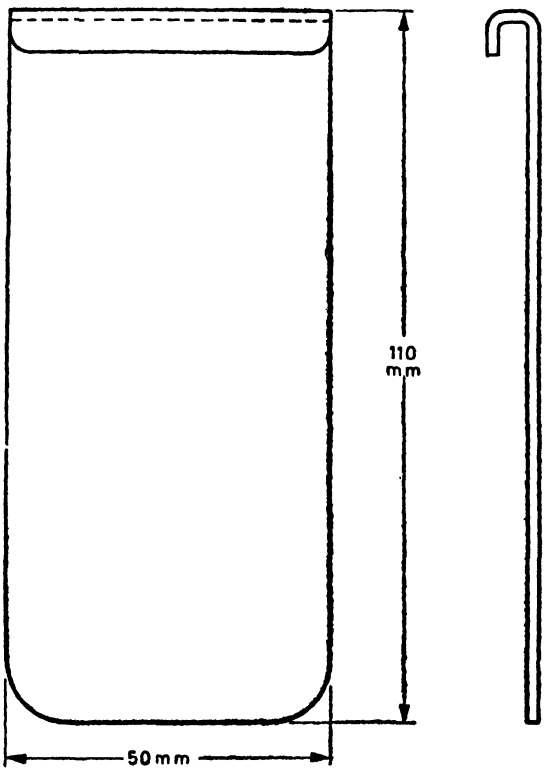


FIG. 5 REMOVABLE SHUTTER

A-4. DETERMINATION OF RESIDUE ON EVAPORATION

A-4.1 Procedure — Take 100 ml of the material and evaporate to dryness in a weighed evaporating basin on a water-bath in a fume cupboard. Dry the residue for 30 minutes in an oven at 100 ± 2°C. Cool in a desiccator and weigh. Dry again and repeat until constant mass is obtained.

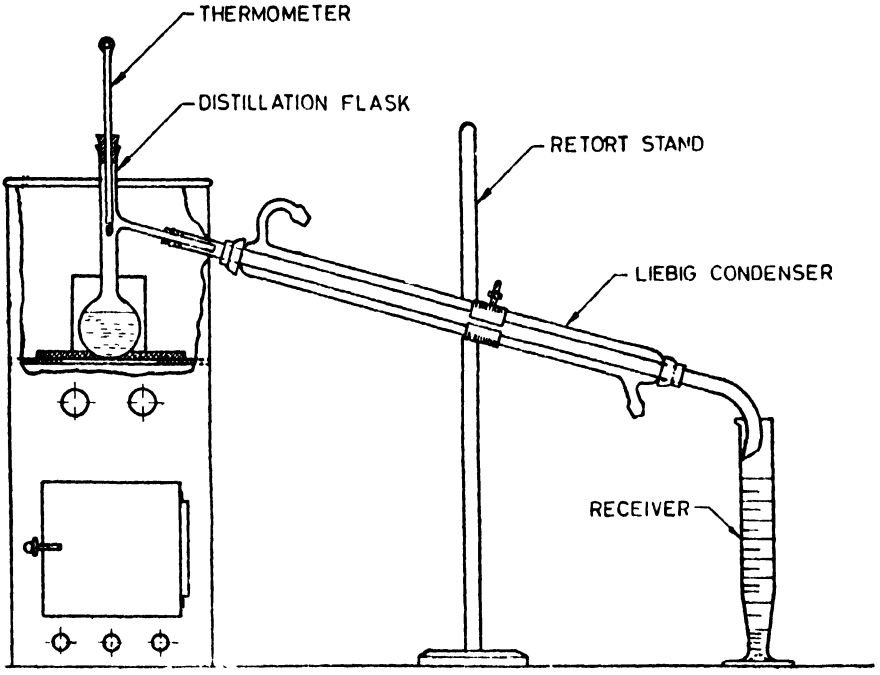


FIG. 6 ASSEMBLY OF APPARATUS

A-4.2 Calculation

$$\text{Residue on evaporation, percent by mass} = \frac{M}{d}$$

where

M = mass in g of the residue,

d = relative density of the material (*see* **A-2**).

A-5. DETERMINATION OF ACIDITY

A-5.1 Apparatus

A-5.1.1 *Conical Flask* — 300 ml capacity, glass-stoppered.

A-5.2 Reagents

A-5.2.1 *Phenolphthalein Indicator* — Dissolve 0·5 g of phenolphthalein in 100 ml of rectified spirit (*see* IS : 323-1959*) and make the solution fainty pink by adding dilute sodium hydroxide solution.

*Specification for rectified spirit (*revised*).

A-5.2.2 *Standard Sodium Hydroxide Solution* — 0·01 N.

A-5.3 Procedure — Weigh accurately about 100 g of the material into the glass-stoppered conical flask. Add 100 ml of freshly boiled and cooled distilled water which has been previously neutralized to phenolphthalein indicator and shake vigorously. Allow the layers to separate. Separate the aqueous layer, add to it 0·5 ml of phenolphthalein indicator and titrate with standard sodium hydroxide solution using a micro-burette.

A-5.4 Calculation

$$\text{Acidity (as HCl), percent by mass} = \frac{0{\cdot}0365\ VN \times 100}{M}$$

where

V = volume in ml of standard sodium hydroxide solution,

N = normality of standard sodium hydroxide solution, and

M = mass in g of the material taken for the test.

A-6. TEST FOR FREE CHLORINE

A-6.0 Outline of the Method — The material is shaken with 3,3'-dimethylnaphthidine solution and the colour developed, if any, is noted.

A-6.1 Apparatus

A-6.1.1 *Graduated Measuring Cylinder* — 50 ml capacity, glass-stoppered (*see* IS : 878-1956*).

A-6.2 Reagent

A-6.2.1 *3,3'-dimethylnaphthidine Solution* — Dissolve 0·01 g of finely ground 3,3'-dimethylnaphthidine in 5 ml of glacial acetic acid and dilute rapidly with water to 200 ml. Store the solution in the dark.

A-6.3 Procedure — To 50 ml of the material contained in the graduated measuring cylinder, add 5 ml of 3,3'-dimethylnaphthidine solution and shake the cylinder for 30 seconds.

NOTE — The test shall be carried out in the dark and colour development shall be checked immediately.

A-6.4 The material shall be regarded to have passed the test if no pink colour is developed.

A-7. DETERMINATION OF MOISTURE CONTENT

A-7.1 The moisture content of the material shall be determined in accordance with the method prescribed in IS : 2362-1973†.

*Specification for graduated measuring cylinders.

†Determination of water by Karl Fischer method (*first revision*).

A-8. TEST FOR COLOUR

A-8.0 Outline of the Method — The colour of the material is compared with that of the colour standard and expressed in terms of platinum cobalt units. The platinum cobalt unit is defined as the colour of an aqueous solution containing 1 part per million of platinum in the form of chloroplatinic acid and 2 parts per million of cobaltous chloride ($CoCl_2 . 6H_2O$).

A-8.1 Apparatus

A-8.1.1 *Nessler Cylinders* — 100 ml capacity (*see* IS : 4161-1967*).

A-8.1.2 *One-Mark Volumetric Flasks* — 250 and 500 ml capacities (*see* IS : 915-1975†).

A-8.2 Reagents

A-8.2.1 *Cobaltous Chloride Hexahydrate* — solid.

A-8.2.2 *Hydrochloric Acid* — relative density 1·16 (*see* IS : 265-1976‡).

A-8.2.3 *Chloroplatinic Acid* — Dissolve 250 mg of platinum in small quantity of aqua regia contained in a glass or porcelain basin by heating on a water-bath. When the metal has dissolved, evaporate the solution to dryness. Add 1 ml of hydrochloric acid and again evaporate to dryness. Carry out this operation twice again.

A-8.3 Preparation of Colour Standards

A-8.3.1 Dissolve 0·50 g of cobaltous chloride hexahydrate and whole of the chloroplatinic acid in 50 ml of hydrochloric acid. Warm, if necessary, to obtain a clear solution and after cooling, pour into 500-ml one-mark volumetric flask. Dilute with water to the mark.

A-8.3.2 Pipette 10, 20, 25, 30, 40 and 50 ml of the solution into 250-ml one-mark volumetric flasks and dilute the contents of each flask with water to the mark. These diluted solutions correspond to a colour of 20, 40, 50, 60, 80 and 100 Hazen units respectively. These shall be prepared freshly.

A-8.4 Procedure — Fill one of the Nessler cylinders to the mark with the material to be tested and the others with the colour standards. Compare the colour of the material with colour standards using a white background.

A-8.5 Report the colour, in Hazen units, of the colour standard which matches the sample.

---

*Specification for Nessler cylinders.
†Specification for one-mark volumetric flasks (*first revision*).
‡Specification for hydrochloric acid (*second revision*).

APPENDIX B

(*Clause* 4.1)

SAMPLING OF ETHYLENE DICHLORIDE

B-1. GENERAL REQUIREMENTS OF SAMPLING

B-1.1 The sampling instrument shall be clean and dry.

B-1.2 Precautions shall be taken to protect the samples, the material being sampled, the sampling instrument and the containers for samples from adventitious contamination.

B-1.3 To draw a representative sample, the contents of each container selected for sampling shall be mixed as thoroughly as possible by suitable means.

B-1.4 The samples shall be placed in suitable, clean, dry, airtight, dark or amber glass or metal containers on which the material has no action.

B-1.5 The sample containers shall be of such a size that they are almost completely filled by the sample.

B-1.6 Each sample container shall be sealed airtight after filling and marked with full details of sampling, the date of sampling, and the month and year of manufacture of the material.

B-1.7 Samples shall be stored in the dark.

B-2. SAMPLING INSTRUMENT

B-2.1 The following forms of sampling instrument may be used:

a) Sampling bottle or can, for taking samples from tanks or drums; and

b) Sampling tube, for taking samples from bottles or small containers.

B-2.1.1 *Sampling Bottle or Can* — consists of a weighted glass or metal container with removable stopper or top to which is attached a light chain (*see* Fig. 7). The bottle or the can is fastened to a suitable pole. For taking a sample, the bottle or the can is lowered into the tank to the required depth and the stopper is then removed by means of the chain.

B-2.1.2 *Sampling Tube* — made of metal or thick glass, is 20 to 40 mm in diameter and 400 to 800 mm in length (*see* Fig. 8). The ends are conical and reach 5 to 10 mm diameter at the narrow ends. Handling is facilitated by two rings at the upper end.

B-2.1.2.1 For small containers, the size of the sampling tube may be altered suitably.

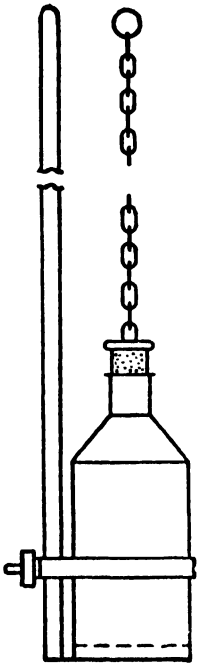


FIG. 7 SAMPLING BOTTLE OR CAN

B-3. SCALE OF SAMPLING

B-3.1 For Tanks and Drums — Each tank or drum shall be sampled separately.

B-3.2 For Bottles and Small Containers — Each lot (*see* **B-3.2.1**) shall be sampled separately.

B-3.2.1 *Lot* — In any consignment, all the containers of the same size and drawn from a single batch of manufacture shall constitute a lot. If a consignment is known to consist of different batches of manufacture or of different sizes of containers, the containers belonging to the same batch and size shall be grouped together and each such group shall constitute a separate lot.

B-3.2.2 The number of containers to be selected from a lot shall depend on the size of the lot and shall be in accordance with Table 2.

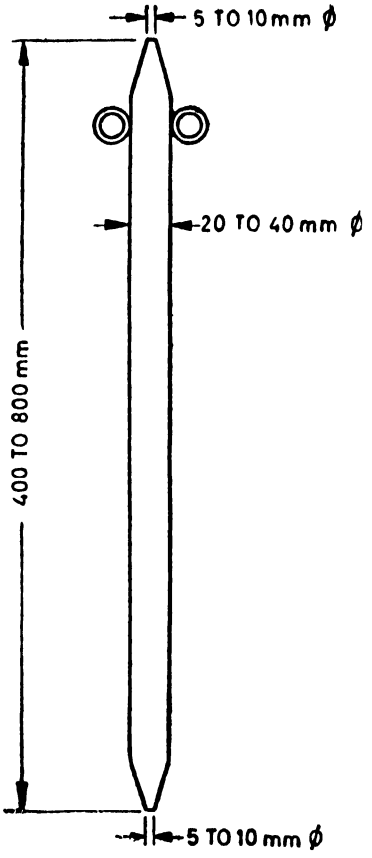


FIG. 8 SAMPLING TUBE

TABLE 2 NUMBER OF CONTAINERS TO BE SELECTED FROM A LOT

(*Clause* B-3.2.2)

LOT SIZE	NO. OF CONTAINERS TO BE SELECTED
(1)	(2)
Up to 15	3
16 to 40	4
41 to 65	5
66 to 110	7
111 and above	10

B-3.2.3 The containers shall be selected at random from the lot and in order to ensure randomness of selection, random sampling procedures given in IS : 4905-1968* may be followed.

B-4. COMPOSITE SAMPLE

B-4.1 From Tanks, Tank Lorries and Drums — As far as possible, samples from tank, tank lorry or drum should be drawn during the operation of filling. In that case equal amounts of the material shall be collected at regular intervals so as to get a total of about 1 500 ml. Where it is not possible to take a sample during filling, the material shall be drawn from different positions and depths with the sampling bottle or can after thoroughly agitating the material so as to ensure a fair amount of homogeneity. The total amount of the material collected shall be thoroughly mixed and divided into three equal portions, one for the purchaser, another for the supplier and the third for the referee.

B-4.2 From Bottles and Small Containers — From each of the bottles or containers selected according to **B-3.2.3**, a small representative portion of the material shall be drawn with the help of the sampling tube. Equal quantities of the material so drawn from the various containers shall be thoroughly mixed to form a test sample of about 1 500 ml. This shall be divided into three equal parts, one for the purchaser, another for the supplier and the third for the referee.

B-4.3 All the test samples shall be transferred to separate containers, sealed and labelled with full indentification particulars. The referee test sample bearing the seal of both the purchaser and the supplier shall be kept at a place agreed to between the two and shall be used in case of a dispute.

B-4.4 Tests for the determination of all the requirements given in this specification shall be performed on the test sample obtained as in **B-4.1** or **B-4.2**.

B-5. CRITERIA FOR CONFORMITY

B-5.1 The lot shall be declared as conforming to this specification if all the test results satisfy the requirements prescribed under **2.**

*Methods for random sampling.

INDIAN STANDARDS

ON

ORGANIC CHEMICALS (MISCELLANEOUS)

IS:

245-1970 Trichloroethylene, technical (*second revision*)
501-1976 Oxalic acid, technical and analytical reagent (*second revision*)
716-1970 Pentachlorophenol (*first revision*)
717-1969 Carbon disulphide, technical (*first revision*)
718-1970 Carbon tetrachloride (*first revision*)
869-1976 Ethylene dichloride (*second revision*)
880-1956 Tartaric acid
3321-1973 Formaldehyde solution (*first revision*)
4105-1967 Styrene (venyl benzene)
4306-1973 Hexamethylenetetramine (hexamine) (*first revision*)
4566-1968 Methylene chloride (dichloromethane), technical
5149-1969 Maleic anhydride, technical
5158-1969 Phthalic anhydride, technical
5254-1969 Acetanilide
5271-1969 Paraformaldehyde
5295-1969 Ethylene glycol
5296-1969 Chloroform, technical and analytical
5297-1969 Perchloroethylene (tetrachloroethylene), technical
5341-1969 Benzyl chloride, technical
5464-1970 Citric acid, monohydrate
5573-1969 Ethylene oxide
5591-1969 Chlorobenzene
5592-1969 Monochloroacetic acid
5992-1970 *p*-Dichlorobenzene, technical
6393-1971 α-Phenylacetamide
6412-1971 Benzoyl chloride, technical
6515-1972 Sodium pentachlorophenate, technical
6712-1972 *o*-Dichlorobenzene, technical
6716-1972 Benzoic acid, technical
6718-1972 Phenoxyacetic acid
6768-1973 *m*-Aminophenol
6775-1973 Ethyl chloride, technical
6971-1973 2-Ethyl hexan-1-ol
6972-1973 Benzotrichloride, technical
7134-1973 Diphenyl
7135-1973 Dimethyl sulphate, technical
7220-1974 Ethylenediaminetetra-acetic acid, pure and technical
7330-1974 Methods of test for ion-exchange resins
7559-1974 Salicylic acid, technical
7618-1974 Hexachloroethane
7619-1974 Pentaerythritol
7729-1975 Sodium monochloroacetate
7901-1975 Triethanolamine, technical
7910-1975 Monoethanolamine
7911-1975 Diethanolamine
7918-1975 Diethylene glycol
8050-1976 Alpha picoline
8058-1976 Pyridine

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	*Unit*	*Symbol*
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	*Unit*	*Symbol*
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	*Unit*	*Symbol*	*Conversion*
Force	newton	N	1 N = 1 kg.1 m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

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